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Bioassay of uranium isotopes in human urine by alpha spectrometry

Fernando P. Carvalho, João M. Oliveira
Nuclear and Technological Institute (ITN)
Department of Radiological Protection and Nuclear Safety
E.N. 10, 2686-953 Sacavém, Portugal
E-mail: *carvalho@itn.pt*

Abstract

Potential poisoning of humans, both civilians and military, with depleted uranium (DU) from ammunition used in the Balkan region war in 1999 prompted an investigation on uranium levels in Portuguese staff that served in United Nations peace keeping forces. Uranium was determined in urine samples from people that was or had been deployed in that region and in a similar reference group not exposed to DU. Uranium was determined by radiochemistry followed by alpha spectrometry allowing the quantification of total uranium and of individual uranium isotopes. Concentrations of total uranium in military staff and elements of the local population in Kosovo, in January 2001 were in average 115 ng/L (range 32- 411 ng/L, n=8) or 2.3 mBq/L (range 0.6-6.9 mBq/L). Concentrations in samples collected in the same period from staff out posted in Bosnia-Herzegovina were in average 36 ng/L (14-682 ng/L) for total uranium, corresponding to 1.0 mBq/L (range 0.4-17.3 mBq/L). Another group of military staff that had been before in duty in the Balkans was also analyzed for uranium in urine with results that were roughly comparable to the ones sampled in January 2001. A control group of Portuguese military that did not travelled to the Balkans was analyzed also and results for total uranium were in average 95 ng/L (range 34-154 ng/L), or 2.2 mBq/L (0.88-4.07 mBq/L). Overall results for uranium concentrations showed no detectable contamination of the personnel with DU. Furthermore, uranium isotope ratios in both groups were compatible with isotopic ratios of natural uranium. Globally, this investigation provided information about the non occurrence of internal contamination with DU in the population investigated and also on the average daily

uranium excretion rates in adult humans. Implications for the internal radiation doses are discussed.